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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,355	11/17/2003	Munehiro Tabata	040356-0496	9164

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EXAMINER

NGUYEN, TU MINH

ART UNIT PAPER NUMBER

3748

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/713,355

Applicant(s)

TABATA ET AL.

Examiner

Tu M. Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 11-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. An Applicant's Amendment filed on December 22, 2005 has been entered. Claims 1, 12, and 13 have been amended. Overall, claims 1-9 and 11-13 are pending in this application.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 5-9, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (European Patent Application EP 1,174,600 A2) in view of Hirota et al. (U.S. Patent 5,974,791) and Russell (U.S. Patent 6,237,326).

Re claims 1, 12, and 13, as shown in Figures 1 and 4-7, Kobayashi et al. disclose a purification device for an exhaust gas of a diesel engine and a method for controlling said purification device, the device comprising:

- a catalyst (17) which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, the sulfur oxides poisoning the catalyst being eliminated by contact with an exhaust gas corresponding to a rich air-fuel ratio;

- a filter (18) which traps particulate matter in the exhaust gas and burns a trapped particulate matter by contact with an exhaust gas corresponding to a lean air-fuel ratio;
- an air-fuel ratio regulating mechanism (8, 9, 10) which varies an exhaust gas composition of the engine between a composition corresponding to the lean air-fuel ratio and a composition corresponding to the rich air-fuel ratio;
- a sensor (120, 130) which detects a particulate matter trap amount of the filter; and
- a programmable controller (9) programmed to:
  - control the air-fuel ratio regulating mechanism to cause the exhaust gas composition of the engine to be in a state corresponding to the rich air-fuel ratio (step S401 with YES answer, step S405 with YES answer, and step S407);
  - determine whether or not the particulate matter trap amount has reached a predetermined amount while the exhaust gas composition is in a state corresponding to the rich air-fuel ratio (step S402 and Figure 5);
  - control the mechanism to cause the exhaust gas composition to be in a state corresponding to a high temperature (step S406), when the particulate matter trap amount has reached the predetermined amount during a period when the exhaust gas composition is in a state corresponding to the rich air-fuel ratio (step S405 with NO answer and step S406) ;
  - determine whether or not the particulate matter trap amount has reached a predetermined decrease state during a period when the exhaust gas composition is in the state corresponding to a high temperature (step S405); and
  - control the mechanism to cause the exhaust gas composition to be in a state corresponding to the rich air-fuel ratio, when the particulate matter trap amount has reached the

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predetermined decrease state during the period when the exhaust gas composition is in the state corresponding to a high temperature (step S405 with YES answer and step S407).

Kobayashi et al., however, fail to disclose that during the regeneration of the filter in step S406, the exhaust gas composition is in a state corresponding to a lean air-fuel ratio; and that the predetermined decrease state corresponds to a particulate matter trap amount smaller than the predetermined amount and larger than zero and corresponds to the particulate filter being partially regenerated.

As shown in Figures 1-2, Hirota et al. teach an exhaust gas purification device comprising a DPF (10a) that is adapted to trap particulate matter, NO<sub>x</sub>, and SO<sub>x</sub> in the exhaust gas. Hirota et al. further teach that when it is time to purge particulate matter from the DPF (step 213 with YES answer), a lean exhaust gas composition at the DPF is required (step 215). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching taught by Hirota et al. in the device of Kobayashi et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art.

As illustrated in Figures 1 and 7, Russell teaches an engine control system with lean catalyst and particulate filter, in which a regeneration of the particulate filter (95) is terminated when a particulate matter trap amount (spa) is smaller than a predetermined amount (S4) but is larger than zero or a lean catalyst temperature is greater than a threshold value; with the last condition corresponding to the particulate filter being partially regenerated in order to prevent the exhaust gas temperature from becoming too high to cause thermal degradation to the lean catalyst (97) (lines 36-44 of column 6). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching taught by Russell in

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the device of Kobayashi et al., since the use thereof would have reduced thermal degradation to the catalyst due to the regeneration of the filter.

Re claim 2, in the modified device of Kobayashi et al., the sensor comprises a sensor (120, 130) which detects a differential pressure between an inlet and an outlet of the filter.

Re claim 5, in the modified device of Kobayashi et al., the air-fuel ratio regulating mechanism comprises an intake throttle (8) which regulates an intake air amount of the engine.

Re claim 6, in the modified device of Kobayashi et al., the air -fuel ratio regulating mechanism comprises a fuel injector (10) which injects fuel into the exhaust gas of the engine.

Re claim 7, in the modified device of Kobayashi et al., the engine comprises an exhaust gas recirculation passage (23) which recirculates part of the exhaust gas into an intake air according to an exhaust gas pressure of the engine, and the air-fuel ratio regulating mechanism comprises an exhaust throttle (25) which regulates the exhaust gas pressure.

Re claim 8, in the modified device of Kobayashi et al., the engine comprises a fuel injector (19) which supplies fuel for combustion, and the air-fuel ratio regulating mechanism comprises the fuel injector set to perform a post-injection after fuel is supplied for combustion.

Re claim 9, in the modified device of Kobayashi et al., the controller is further programmed to determine that, when the exhaust gas composition of the engine has continued to be in the state corresponding to the lean air-fuel ratio for a predetermined time, the particulate matter trap amount has reached the predetermined decrease state (steps S405-S406).

Re claim 11, in the modified device of Kobayashi et al., the predetermined decrease state corresponds to a differential pressure when the controller started to control the air-fuel ratio

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regulating mechanism for the first time to cause the exhaust gas composition of the engine to be in the state corresponding to the rich air-fuel ratio.

4. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. in view of Hirota et al. and Russell as applied to claim 1 above, and further in view of legal precedent.

The modified device of Kobayashi et al. discloses the invention as cited above, however, fails to disclose that the state of the exhaust gas composition corresponding to the rich air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 0.95 to 1.0; and that the state of the exhaust gas composition corresponding to the lean air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 1.05 to 1.1.

Kobayashi et al. disclose the claimed invention except for specifying an optimum range of excess air factor of 0.95 to 1.0 and 1.05 to 1.1 for the rich air-fuel ratio condition and the lean air-fuel ratio condition, respectively. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of excess air factor for each of the rich air-fuel ratio and the lean air-fuel ratio condition, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

### ***Response to Arguments***

5. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Russell fails to teach or suggest a regeneration of a particulate matter trap that has a predetermined decrease state corresponds to a particulate matter trap amount smaller than a predetermined amount and larger than zero and corresponds to the particulate filter being partially regenerated (pages 9-10 of Applicant's Amendment), the examiner respectfully disagrees.

In Russell, even though the goal is to fully regenerate the particulate matter trap (95), the regeneration of the trap will be interrupted to prevent an exhaust gas temperature from rising too high to damage a downstream lean catalyst (97) (see lines 36-44 of column 6). In the pending application, the goal is still to fully regenerate the particulate matter trap (see step S5). According to paragraph 0062, the regeneration of the trap is completed when a pressure difference (across the trap) drops below a "second predetermined value"; and according to paragraph 107, this "second predetermined value" is set to be 0%, which is a clear indication of a fully regenerated trap. Only in paragraph 0064 that applicant states the resetting of the second predetermined value to burn particulate matter a little at a time in order to prevent excessive rise of the trap temperature. In Russell, a lower non-zero limit amount S4 is set to regenerate the trap with a catalyst temperature continuously monitored to safely regenerate the trap without damaging the downstream lean catalyst (97). Thus, Russell appears to apply the same procedure as that in the pending application to fully regenerate a trap without causing damage to the trap itself or to a downstream catalyst. Consequently, it seems to the examiner that Russell at least teaches or suggests the claim limitation is dispute.

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

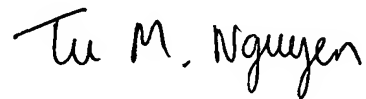
***Communication***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink that reads "Tu M. Nguyen". The signature is written in a cursive, flowing style.

TMN

Tu M. Nguyen

March 15, 2006

Primary Examiner

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